



The G.E.-Allison J-35 turbojet, previously known as the TG-180 is a straight-through, axial-flow design. In this "Flight" copyright drawing the electric starter/generator and other accessories, normally carried within the central intake fairing, have been omitted, but their drives are indicated.

# Foremost American Turbojet

## Some Details of the Slim, Axial-flow J-35

ALTHOUGH this country's confidence in gas turbine power units for civil air transports is not as yet shared by the Americans, they are nevertheless equally convinced that practically all military aircraft must in future be turbine-powered. The most widely used American conceived and produced turbojet is the J-35, designed by the General Electric Company and originally known as the TG-180. It is now under intensive development by the Allison Division of General Motors. An earlier plan was for the quantity production of this unit to be undertaken by the Chevrolet Motor Division, but in 1946 the production contract was transferred. All the details and equipment were moved from Tonawanda, N.Y., to Indianapolis, and production commenced early in 1947. Now, in addition to the Republic Thunderjet, of which large numbers are ordered for the U.S. Air Force, J-35s are installed in Douglas, North American, Consolidated, Boeing, Martin and Northrop prototypes.

Certain details of construction of the J-35 are still regarded as confidential, but all main features can be described. The design is based upon an eleven-stage axial-flow compressor feeding straight through eight combustion chambers to a single-stage turbine. The compressor rotor is made up of ten aluminium alloy discs and one steel disc, shrunk on to a hollow steel shaft. The discs each carry a stage of steel blades, and this hollow rotor assembly is supported on one roller and one ball thrust bearing. The stator casing is of the normal split type and carries eleven rows of steel stator blades between two separate single rows, one as a guide at the inlet and the other for straightening at the outlet end. Compression ratio is 4 to 1 and air mass flow at 7,770 r.p.m. at sea level is 70 lb/sec.

Stainless steel combustion chambers with flame tubes of the same material are fitted. Each has a Duplex fuel injection nozzle which feeds downstream.

Welding is used extensively for the turbine assembly. The nozzle guide vanes, of which there are 64, and their casing and diaphragm are a fabricated stainless steel structure. The 126 alloy steel turbine blades are welded to

the rim of the turbine disc and the disc is in turn welded to the rotor shaft, which is supported in two roller bearings. The interconnecting shaft is splined to the compressor drum and secured by a single long bolt. The turbine outlet temperature at rated power is 675 deg. C.

Accessory gears and the front bearing are supplied with oil direct from the pressure pump as part of a dry sump system, while the three rear bearings are lubricated with oil mist, the requisite air supply being tapped from the fourth stage of compression. A General Electric direct-drive starter/generator is employed.

Unlike our own leading turbojets, such as the Rolls-Royce Nene, which must now be regarded as a competitor in America, the J-35 has an axial-flow compressor, and chiefly as a result of this feature the frontal area has been kept particularly small. The unit is by no means at the end of its development life, and the present rated thrust output, which is considerably below what the aircraft manufacturers would like, should slowly be increased to over 4,000 lb. With the aid of after-burning a large power boost can be achieved for a very short period, and it was in this way that the Douglas Skystreak research aircraft, powered by the J-35, achieved its record speed of 650.6 m.p.h.

### TRAGIC LOSS TO BRITISH GLIDING

ON Thursday, July 29th, two of Britain's leading glider pilots were killed while taking part in the International Gliding Contests in the Samedan area of Switzerland.

Cdr. Chris Nicholson crashed in a storm over Mount Berlingera, near Domodossola. Mr. Donald Greig was forced to bale out over Edolo on the Italian side of the Bernina Pass, and it appears that his parachute failed to open.



Cdr. Nicholson.

Donald Greig.

These tragedies seem almost unbelievable, in view of the peaceful beauty picture in one's mind when thoughts turn to soaring in bright sunshine over the Alpine slopes. Cdr. Nicholson served with the Fleet Air Arm, and was a most talented architect. He leaves a widow and three children. Mr. Donald Greig was one of the first members of the London Gliding Club. We extend our deepest sympathy to their relatives.

#### G.E.-ALLISON J-35 DATA

Diameter	37.5in
Length (with jet pipe)	145.0in
Frontal area	7.7 sq ft
Weight	2,425lb
Take-off power, static S.L.	3,750lb thrust at 7,700 r.p.m.
Rated power, static S.L.	3,270lb thrust at 7,400 r.p.m.
Cruising power, static S.L.	2,540lb thrust at 6,882 r.p.m.
Fuel consumption (cruising)	1,075 lb/hr/lb thrust
Oil consumption (cruising)	1.8 lb/hr